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OF THE
BOSTON SOCIETY
OF
CIVIL ENGINEERS



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BOSTON SOCIETY OF CIVIL ENGINEERSFOUNDED 1848

PAPERS AND DISCUSSIONS

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**APPRENTICESHIP IN THE BUILDING TRADES OF
BOSTON**

BY WM. STANLEY PARKER; GEORGE THORNTON; MAJOR HEYWOOD S.
FRENCH AND JAMES M. GAULD

(Presented September 19, 1923.)

INTRODUCTORY REMARKS BY COL. FRANK M. GUNBY *

THE subject of this meeting is "Apprenticeship in the Building Trades of Boston." Two years ago we had a meeting devoted largely to the question of seasonal unemployment in the building trades. To some of us the attendance at that meeting was quite a surprise, for it developed to have been the largest we had during the year.

I attributed this a good deal to the fact that we had speakers we don't ordinarily have. All groups of the building trade were represented, — the architects, engineers, contractors, and another group we had not had before, — the labor men. The result rather encouraged us to try the experiment again.

In casting round for subjects for this year's meetings, we were wondering what some of the live topics were. One of the things the Committee on Papers and Program picked out as important was the subject of labor, and when we got on that we promptly landed on the subject of apprenticeship.

* President, Boston Society of Civil Engineers, and a representative of the Boston Building Congress on the Apprenticeship Commission.

There has been such a lack of apprenticeship, it is worth while telling about it. A little while ago a survey was made to try to find out how many apprentices there were in the building trades in Boston. Among the thirty thousand men or so in Boston engaged in the trade there was a big disagreement. One side said one hundred and fifty; the other said fifty. Somewhere between the two is evidently the answer. So we are trying now to develop apprenticeship in the building trades in Boston.

There are one or two fundamental differences between the system being tried now and the old condition. The first difference is that the apprentice under this new system is apprenticed to his craft and not to the individual employer. Second, the system is to be operated both by the employer and the employee group, and we hope we are going to continue as happy and enthusiastic as when the start was made.

In order to cover the subject we have arranged four definite speakers and it is hoped there will be a discussion afterward. These speakers have been asked to cover the subject from the several angles of the building trade. We have one architect, one speaker from the contractor group, and two from the labor group.

The first speaker is Mr. William Stanley Parker, who will talk from the general point of view of the Boston Building Congress.

WILLIAM STANLEY PARKER *

Colonel Gunby spoke about the apprenticeship problem as being a "live" problem. Perhaps the apprenticeship problem as a problem is alive, but the apprentice may almost be described in recent years as a "dead" one. In fact one might almost quote the too general remark we hear to-day that begins "Yes . . .". But I won't quote it because it is too old.

There is a certain element of tragedy in the situation, and as a noted tragedian once remarked rather pungently to his mother, — so I suggest that you look first on this picture and then on that. It wasn't very agreeable to her, and it is often not very agreeable to look on past pictures. But I want first

* President, Boston Building Congress; Vice-President, American Institute of Architects, and President of the Commission on Apprenticeship.

to look at the past system of apprenticeship and then at the system which is being put into motion to-day, and which we hope will make for progress.

In looking at the past system I want to point out some reasons why it was to so large extent a failure. It seems to me — to put it very briefly — that the failure in the past to develop apprentices has been due to the attempt to bring the individualistic system of apprenticeship into a very large community. That is the fundamental reason, I believe, why it broke down. In the past when an apprentice became indentured to an individual employer his security of employment depended solely upon the ability of that employer to keep him employed and also to vary his work, so that he should have not only steady employment but an all-round training. With the fluctuations in work that exist to-day among the larger contractors they are having increasing difficulty in keeping any material number of apprentices, even if they existed, in steady employment. This is one of the things that makes it difficult for the contractor to assume any large number of apprentices, and it is a difficulty of the individualistic system. If the contractor hasn't a sufficient amount of work then the apprentice is either kept at work of not much benefit to him, or else he loses his job and has to find other employment. That system, with the present fluctuations in employment, is satisfactory neither to the contractor nor to the apprentice, and leads contractors to cease taking on apprentices.

Another situation which has been serious in the past is that, during times of peak loads in the labor demand in the building trades, — apprentices or half-baked journeymen have been lured into positions of greater responsibility than they were equipped to assume; and yet you can't blame them for going to some outlying district where they knew there was a demand and where they could get a journeyman's wage and "get away with it." This in the past has led many an apprentice to break his apprenticeship in order to make a little quicker headway. After a relatively short time he perhaps would come back and approach his former employer for work, as a full-fledged mechanic, technically speaking but not technically

trained. This did not please the employer who had borne the expenses involved in carrying the apprentice in his early days and then was not permitted to derive the benefit from his employment in the later years of his apprenticeship. That is another of the important reasons why contractors have turned against taking on apprentices in recent years.

In one of the Joint Committees discussing one of the crafts recently, that point has cropped up. One contractor turned to another and asked, — "Will you take on some apprentices?" Instantly the other contractor responded, — "Not on your life." We all smiled and he of course realized that he had said something not quite consistent with his being there. His explanation was very emphatic. He said he was tired of having them come for a little while and go to the expense of training them, only to have them skip out. There has been in the past no control over the apprentices' actions. As a result of those two principal difficulties, together with the general dislocation of all rules of procedure in the past eight or nine years, we have been faced in the last few years with practically no apprentices, and even where we have had them with no systematic method of developing them into skilled mechanics. I don't think there are any trade agreements in the building industry which do not provide in words for a system of apprentices, — either under that name or as "helpers" or "improvers", or some other name. But the system has not actually developed in recent years any apprentices.

The present situation has been brought about by steps taken by a new organization of which you have heard something, — the Boston Building Congress, — and it seems to me to be the kind of organization that is needed. The reason why it has been possible for it to put under way, with some hope of success, a system of apprenticeship, is because it is an organization including all the elements in the industry formed for the purpose of discussing the problems of that industry in order that it may help bring about improved conditions.

It is made up of architects, engineers, contractors, sub-contractors, labor men, materials men, material producers and building investment men. Those eight principal elements in

the industry comprise the Building Congress, and anything which comes out of the deliberations of the Congress comes out of the deliberations of all these elements, who have been present and have discussed the thing frankly, with all their cards on the table. And you have no idea what a good effect it has had on all of us to discuss things under those conditions. Any two habitual rivals may get together in a room and fire a lot of "buncombe" at one another. But let them discuss the same subject with four or five other elements of the industry present, and that has the admirable result of eliminating the buncombe and in getting them down to brass tacks. They know what the others think and hear them discuss matters freely in open meeting, and this has a very healthy effect on every one concerned.

The Building Congress first took up the question of seasonal unemployment, which is first cousin to the apprentice situation; and later the question of apprenticeship. The New York Building Congress took up the apprenticeship system first and put their system into effect something over a year ago, so they have had a trial of it for a full year and we have had the benefit of their experience. We started discussing the subject about a year ago, and finally in the summer of 1922 suggested that a Joint Investigating Committee be appointed, — three from the Building Trades Association, three from the Building Trades Council, and three from the Building Congress to represent the other elements in the industry. That committee was appointed and reported in November that what was needed was a permanent Commission on Apprenticeship for the industry, which would be a general guide and a controlling factor tending to uniformity in practice; and in each craft a Joint Apprenticeship Committee, made up equally of the employer group and the mechanic group, and in each craft this joint Committee would have full power, operating according to general rules laid down by the Apprenticeship Commission.

That report was finally adopted, — I believe it was in February. The Building Trades Council adopted it one week and the Building Trades Employers' Association and the Building Congress the following week. It went into effect and we had the first meeting of the Apprenticeship Commission in March,

1923, so we have been going not quite six months. The organization of that Commission — which is fairly broadly representative of the industry — is as follows: three men appointed by the Building Trades Council (the labor group); three by the Building Trades Employers' Association (the contractor and sub-contractor group); and three by the Building Congress from those representing other elements than the contractor and the labor groups, — these three being myself representing architects, Colonel Gunby representing engineers, and Mr. W. H. Graves the material distributing group.

We laid out a method of procedure, drafted an outline of certain fundamentals that should control the situation, and presented to all the crafts a skeleton outline of a set of rules. Some seven or eight crafts have been in joint-committee deliberation upon these rules, and two of the crafts have agreed definitely to adopt the systems, — the carpenters and the bricklayers.

I want to make perfectly clear the difference in the functions of the two operating factors, the Commission and the Craft Committees. The Apprenticeship Commission has no intention or desire to intimate that it is doing all this work — that it is taking over the responsibility for creating apprentices in the carpentry or bricklaying crafts, or any other craft. It is simply functioning as an advisory commission representing the industry as a whole, to assist in directing and stimulating the crafts to direct in orderly fashion their own apprentice systems, to get their own recruits and to supervise the training and the employment of them. It would be most unhealthy if anybody outside any craft endeavored to enforce upon that craft a system of apprenticeship. That must be done within the craft, if any basis of permanency and success is to be obtained.

Colonel Gunby has touched upon what I think is the most important fundamental of the system, — that is the indenture of the apprentice to his craft. The apprentice makes his application to, and when he is taken on he signs on with, the Joint Apprenticeship Committee of his craft. He signs a statement that he has read the system of apprenticeship adopted by the craft and agrees to abide by it and all the rules of the Joint

Apprenticeship Committee. If he tries to double-cross his craft he will find it much more difficult than it has been in the past to double-cross an individual employer; and he will also have a much greater chance of steady employment, because one of the fundamental duties of the craft Joint Apprenticeship Committee is to keep him steadily employed during his apprenticeship period — three or four years as the case may be in that particular craft. Instead of being dependent on the individual employer he has this Committee back of him and if his employer is for the moment slack the Committee must take him and put him with some other employer who is busy. With a normal amount of business the apprentices should be taken care of all through their apprenticeship period, if the Committee can in this way shift them about. This shifting can be done by the Committee not only for the purpose of giving steady employment, but also for the purpose of giving all-round training. It is not easy to pick many employers who can take on a large number of apprentices and give them all the necessary elements of their trade. They are apt to concentrate more or less on one kind of work, and it will be undoubtedly necessary to shift the apprentice frequently for his own interests and the interests of the trade. That power the Joint Apprenticeship Committee has, and they must keep a record of the apprentices and see that by the end of their apprenticeships they have secured sufficient and thorough training in all the different elements of their craft.

The object, then, of the Craft Committee is to represent the heart of the system in each craft. Inasmuch as you have both elements — employer and employee — on the Committee you have both points of view represented and have opportunity to prevent, by complaint from either side, abuse of the system by either the mechanic or the employer; and the likelihood of either is just about the same. It is about as hard to sell the idea of this apprenticeship system to certain contractors to-day as it is to certain labor men. To change the system immediately it is impossible to expect. It is a long-term proposition. The change will take a number of years to work out and it will never cease. Like any educational program it is a permanent job.

Briefly in closing I would like to point out the co-operation that the schools are offering, because in this system one fundamental is that the boy learns his trade in the field by doing actual work. But during his apprenticeship period he must also take a certain amount of related training, — mathematics, science, general knowledge, technical trade information, — and this he can do in the classroom better than he can in the field. This we accent very strongly, the need of learning the trade in the field and not in the classroom. It is a field job with some related class training. It has been very interesting to me to find that the labor men on our Commission argued quite as strongly for that principle as did the other elements. There still remains, however, that other side that must be taken care of, and the school system is co-operating very generously in promising, and I believe will furnish, the fullest amount of training that we want in the school. This is a night school program of two nights a week, two hours each night. We have been in conference with the School Committee and hope to cut this schedule down to a minimum. We are not trying to make foremen, we are trying to make good mechanics. If an intelligent and interested mechanic wants to become a foreman, that is his own job later on, and there are plenty of ways for him to do it.

So with the co-operation of the craft committees; with the Apprenticeship Commission as the controlling factor, representing not only all the crafts but the other elements connected with the industry as well; and with a central secretarial office that will do the paper work for all these crafts committees; we feel we have a layout that promises general interest, steady control, permanence of employment to the apprentices, and permanency of employment of apprentices by the contractor, thus giving both a sense of security. And by having a well-organized method of approach to the building industry we hope that we can get the number of apprentices that we need by showing them an easy way into the industry, with a steady, graduated increase of wages every six months, throughout their period of employment, until they graduate into full-fledged mechanics.

GEORGE THORNTON *

I am pleased at the opportunity to come before the Boston Society of Civil Engineers this evening as a representative of the Bricklayers, Masons and Plasterers' International Union, a craft that has had so much trouble from seasonal unemployment. No craft in the building industry knows better what it is to lose so many days during the year than the bricklayers and masons, and the subject of apprentices of the trade, particularly in bricklaying and stone masonry, is one that in my opinion is greatly misunderstood by the public. There have been newspaper stories from time to time touching upon the scarcity of building mechanics and describing the shortage as due to the restrictions placed upon apprentices by the labor unions, but this is not a fact. Take the City of Boston to-day, with the membership that we hold in the bricklayers and stone masons, the number of apprentices is astonishing. There are about eighty apprentices indentured at the bricklaying trade. Thirty-nine of those apprentices are indentured to contractors. The balance are indentured to their fathers. It was because of the necessity of taking the boy and indenturing to himself that the father did this. The boy could not be placed with contractors. There are no restrictions placed on apprentices, either by the International Union of Bricklayers, Masons and Plasterers, or by the local unions in this city. The local unions prescribe certain laws for the government of apprentices. One condition is that the apprentice must be at least sixteen years of age and know how to read and write the English language, and a boy taken under the age of eighteen shall serve until twenty-one. A boy taken over the age of eighteen shall serve three years. A contractor is permitted to take three apprentices. Our unions in this city are dealing to-day with over one hundred contractors and if those contractors took their full quota of apprentices there would be a number far in excess of the eighty now registered in this city. So you see, the fault of the shortage of apprentices must rest upon the shoulders of the contractors, not on the unions. The International union places no restrictions

* Second Vice-President of the Bricklayers, Masons and Plasterers' International Union of America.

upon apprentices, because the law states that subordinate unions shall have the right to regulate their own apprentice laws. In several of the larger cities throughout the country, through the Joint Conference or Arbitration Board between the employers and our unions the apprentice question has been taken care of satisfactorily in the past.

As Mr. Parker states, it is a great question, here, — how to teach the boy the business in a proper manner and keep him continuously employed, — a question that will engage the attention of the Commission that will have the apprentices in charge. The evolution of the building industry, to my mind and experience, has brought about a condition that did not exist years ago in the building industry, and particularly in our craft. Thirty years ago apprentices were taken on not alone to learn the trade, but also to act as errand boys, because the telephone was not installed in the lockers on the jobs in those days, and when it was necessary to look up the material the apprentice was the errand boy. That has been done away with to-day, and the contractors feel it is not profitable to take on an apprentice. This is not in line with the advertisements we have been reading in New York papers, where certain individuals and schools were advertising to turn out graduated apprentices after a four weeks' course for twenty dollars. Now we know what kind of apprentices would be turned out after a four weeks' course. We know that the boy, if he is continuously employed for three years by the contractor and given every opportunity to learn all branches of the trade of masonry, with all the short cuts in connection with the bricklaying trade, will not be a full-fledged mechanic without those three years. But the union wants to see him not alone a journeyman fully qualified to demand a standard scale of wages, but wants to see him learn the technical part of the trade. It wants to see him when he has completed his term of apprenticeship qualified and able to take charge of work. That is the aim of the unions to-day, — to make the boy so he will be able to make his mark in the building world. Some of the brightest lights, I might say, in the building industry in New York City are graduated apprentices from old time firms in Boston. Take the Woolworth Building, — the superintendent

of that building was a graduated apprentice from this city. One of the engineers on the Singer Building at the time of its erection was a graduated apprentice of the bricklaying trade of this city. Several other of the large buildings of New York City were built either under direct supervision of a superintendent or assistant superintendent from Boston. That is the kind of apprentices we hope will be developed through the system now being adopted by the Building Congress.

I spoke about the number of apprentices in the bricklaying craft of our city. The stone mason branch, I am sorry to say, has a very poor showing. There is only one apprentice indentured to learn the stonemason's branch of the trade. Do you realize what that means in the future? It means that the stone masons — men who can cut their stone and set it and do all kinds of ashlar work — will be extinct in a few years, because we are not developing men to do that work, nor do the architects specify that kind of work in buildings now, particularly in municipal or public buildings. Just think, in a city of this kind, one apprentice to learn the stone mason's trade. This is the condition in the marble industry. There is an agreement adopted between the National Marble Dealers' Association and the Bricklayers, Masons and Plasterers' International Union, which provides conditions under which the apprentices are taken. They are supposed to be taken first into the shops, for the first two years to learn cutting and then the third year are taken out on the building to learn to set the marble. In that way they are fully qualified at the end of three years to cut and set marble. It is a national agreement and applies to all of the cities and towns in the United States. The tile industry is also under a national agreement with our organization and the laws in regard to the apprentices in the tile industry are specified in an agreement drawn this year between the representatives of the Tile and Mantel Contractors' Association and our Executive Board. The agreement provides, as does the new Boston system, that a certain percentage of the journeyman's wage should be paid to the apprentice for the first year, so much the second and so much the third. They do not have the six months' period, as outlined in the present plan.

In the Bricklayers, Masons and Plasterers' Union there are registered at present about nine thousand apprentices. This would indicate about ten apprentices to each one hundred members, and in some cities the percentage is larger. In Philadelphia the number of apprentices, under the plan of the Building Congress, is one hundred and seventy-five bricklaying apprentices indentured with the bricklayers' union. The number in New York City, I am not able to quote authentically at this time, but I know that for years in that city it was absolutely necessary for the father to take the boy in order that he might learn the trade. The largest firms in New York City had no desire to take apprentices. The only way the father could give the son an opportunity to learn the trade was to take him with him. It has been said that our law which gives preference to the sons of members, is a restriction upon other apprentices. It is our claim that no boy has a better right to learn any branch of the masonry craft than the son of a member and when it comes to a question of choice we give it to the son of the man who is himself a journeyman bricklayer, mason or plasterer, and in doing this we have no apology to offer for that preference.'

In this city, I want to assure the committee representing the Building Congress, that it will have the hearty co-operation of the bricklayers' and masons' unions in that plan. It is our desire to co-operate in every way with any plan having for its purpose the turning out of better workmen, and we know if this plan is followed up, regardless of faults that might appear at the present time, in the end it will be the best thing that could have happened for the apprentices. We know the trials of the apprentice who has been indentured to what the bricklayer terms "the shoestring contractor". This individual will shout the loudest for apprentices when he has a small job to do, and stand up for his supposed right as a contractor to take the number allowed by law, but just as soon as that job is finished the apprentice is thrown out of employment. He is thrown upon the union and the union's duty is to furnish that boy employment. That is one reason why the unions place restrictions upon such a class of contractors taking apprentices. They cannot teach even one boy the trade, because their business doesn't

permit it. Some of the largest contractors who have apprentices now employed upon their operations, have apprentices not indentured to themselves but indentured to the journeymen working on the operation, so when the operation is finished the contractor doesn't assume any responsibility. That is another reason why many of them are not desirous of taking on apprentices. The International Union of Bricklayers, Masons and Plasterers in 1921, when they decided to register apprentices at headquarters, started in the month of May with a registration of two thousand, which has grown up to the present time to about nine thousand apprentices. According to the reports the present registration will turn out three thousand journeymen each year. That quota will meet all demands, and we believe that when the present condition in the building industry gets back to normal there will be a surplus of men.

Do you gentlemen realize that up till 1922-1923 there hasn't been a year in the last one-third of a century, according to the reports at our headquarters, but what from twenty to thirty per cent of our membership have been walking the streets out of employment; and that number doesn't include the number that had to lose time because of inclement weather and the lack of building material. So with that condition confronting our craft for over a third of a century, and just because of the abnormal building boom that struck this country in 1922, we are not alarmed about a lack of building mechanics. Men will walk the streets as they have in years past, and with that condition confronting those in the building industry and particularly the basic trades that are confronted with a greater loss of time, what are those men going to do then to provide the necessities of life for their families? The bricklayers and plasterers, two branches of the masonry craft in particular have been ridiculed and cartooned through the daily press, because of the high wages received. This is not the fault of the men. You have got to place the blame somewhere else. If the standard rate established by mutual agreement calls for a certain amount of money and there is more money paid to the workmen, he would be a fool to refuse it, but he wouldn't have a chance to accept it if it wasn't offered. But it has been offered and the

snowballing of wages described in the papers is the fault of the employers and not of the men. They realize that it was a case in the winter time for years, of eating snowballs, when there was absolutely no chance of employment, and also realize that the present condition will only last for a year or two and then back to normalcy and unemployment. But they want to see that during the present time no restriction shall be placed on young men or boys to take up the trade, and they also realize that in every craft in the building industry the greatest asset is that every man who is a member shall be one hundred per cent competent, because the "boot" or the poor mechanic is no asset to any organization. The fault of the poor mechanic being turned out as he is, is because he may have developed simply from a handy laborer who was given an opportunity to learn the trade because the employer was too mean to hire a proper man to do the work if he had a handy man who he thought could do it. That system has developed many men who are not up to the standard of the boy who has satisfactorily served his apprenticeship with his employer, — who has been given an opportunity to learn the business in a thorough manner. That is the condition in the craft I represent.

In Cleveland they have outlined a plan that has been carried into effect at the present time, where the union and the contractors co-operate in teaching the apprentices not alone the practical part of the trade, but the theoretical part of the trade, under the supervision of an instructor, and our organization considers it one of the best apprentice plans now in operation.

In Chicago for a number of years the apprentice plan adopted between our local union and the mason contractors provided that the apprentice should attend school so many nights a week for so many months during the year, and that the boy was obliged under penalty to attend the school satisfactorily. That system of apprenticeship in Chicago has turned out splendid mechanics. It wasn't so well developed as the Cleveland plan, but nevertheless for years it was in existence and proved satisfactory. There are other places, Kansas City, Spokane and several other cities where our unions are co-operat-

ing with the contractors trying to develop a better class of apprentices and have them also attend school certain nights in the week, particularly during the winter months. All of which shows a tendency on the part of the unions to co-operate with the employers for the production and advancement of the apprentices.

Now, as I stated, there is no question as to where our craft stands in this city. We will co-operate. The representatives of our craft on the Committee are men who understand the building industry. They understand the needs of the boys, and will see to them. If it is possible to keep a boy in continual employment they will do so, — no question about that. That is all the contractors need, — one hundred per cent co-operation. If the contractors will be as faithful in living up to the terms of that plan, I believe it will go far in Boston in getting a contented group of apprentices and we will see young men more anxious to apply themselves to the various crafts in the building industry than at the present time.

MAJOR HEYWOOD S. FRENCH *

The employers in the building industry of Boston as represented by the Building Trades Employers' Association have indorsed the movement to provide for the training of apprentices and have a representation of three of their members on the Apprenticeship Commission as well as having their members serving on each of the different trade committees. In normal times the larger part of the construction work in this city is carried on by the members of the association but whenever the building industry becomes of a highly speculative nature as has been the case during the last few years they are not in charge of the greater part of work. It has been estimated that during the last two years about sixty-five per cent of the men in the carpenter and mason trades have been working for those who have had little previous connection with building and who are not concerned with establishing or maintaining sound and stable conditions in

* Representative of the Building Trades Employers' Association on the Apprenticeship Commission.

the industry. The members of the Association, however, realize that this is but a temporary condition and it is more necessary than ever before in the history of the country to assure a supply of well equipped, thoroughly trained, self-respecting American mechanics in the building trades.

Not only is this necessary to provide the skilled men for the different undertakings, but from their ranks must come not only the men who are permanently employed by the leading firms and available at short notice for responsible work but also the sub-foremen, and the foremen, the superintendents of the large firms, and the smaller individual contractors. The possibilities of advancement in this line of work compare in my opinion most favorably with those in any other line. Rapid advancement is practically assured to any young man who is diligent and anxious to learn, who will convince himself that the way to advance is to work hard, that his employers interests are his interests, and will strive to do a little more than he could be forced to do by the strict interpretation of his employment agreement, and for a few years at least will devote all of his spare time to acquiring all possible proficiency and experience in his chosen calling. It is the hope of the employer that the young men taking the opportunity of enrolling under the present system will be afforded an opportunity to develop into such a class of workmen as will maintain the tradition that this city is the home of the best of mechanics.

I do not think it can be disputed that during and since the war standards of work in the building line have been seriously lowered, but this is true in all lines, and we in the industry are making determined efforts to return to the standards of pre-war days. If the movement to train apprentices is earnestly carried out it will do much to re-establish that personal relation and feeling of mutual respect between the workman and employers without which there can be no great success.

It may be thought by many that the interest of the employer in this or any similar movement is a purely selfish one and that he is concerned solely in trying to have provided the greatest possible number of workmen with only such a training as will enable them to "get by" in order that they may be more com-

pletely and easily controlled. I feel very sure that I voice the opinions of the members of the Association and also of all reputable and responsible contractors connected with the building industry wherever found when I say that what we are working for in taking part in these movements is to provide for bringing into the ranks of this particular branch of construction the bright, skilfull, hardy young man who wants to become not only a workman proficient in his particular line, but one who will have a good general knowledge of the related trades. One who will be able to look with pride on the particular work which he personally performed on any structure. One who aims to become a person of consequence in his community and who looks forward to the day when he will be called to greater responsibility in his chosen vocation. One who will do his own thinking and be willing to assume his full share of responsibility for his acts. The contractors are backing this program with these objects in view and the hope that in years to come the men produced under this system, when associated with the men who will come into the industry with a thorough technical education and training will maintain it upon the high plane which it always (unless possibly very recently) has occupied.

In many respects the adopted method of handling apprentices differs from the older ways. It was perfectly possible for a young man to start with one firm and to get a thorough understanding of all the problems to be met with in his trade, but at the present time there are very few organizations which carry on such a diversity of work that they can give the apprentice the necessary training to make him an all around man who can fit in to any place and perform satisfactorily his part. It is for this reason that the men will be apprenticed to trade committees and be generally under the supervision of the Apprenticeship Commission. This enables the apprentice to not only acquire the experience in all details of the trade but to perfect himself in some particular branch which specially appeals to him. With representatives of his future employers upon the Committees which are supervising his work and giving the benefit of their experience, it would seem that a very great step had been made in providing for the future supply of men skilled in the various

crafts. The system provides that those deciding to enter a trade will be sure of acquiring a thorough training for that particular trade. The question arises as to whether the number desiring to learn any trade will be sufficient to maintain the system. At the present time it is not easy to interest people in lines which promise a period of hard and often disagreeable work when there are apparently so many openings which promise liberal returns for very little effort. But that difficulty will soon be met for many people are now envying the skilled mechanic not only on account of his financial returns but also on account of his independence. It has been said that many are deterred from learning a trade on account of the restrictions of the unions as to membership. While there may be cases of oppression on the part of some of the unions along this line, any man who becomes skillful in any trade will have an opportunity of earning his living at that trade.

Provide us the young men who want to become building mechanics and we will train them to do your work.

JAMES M. GAULD *

The position I am in to-night is rather peculiar on account of the fact that the issue before us has been presented in one instance as a live one and in the other as a dead one. And to me it appears as one of the greatest problems of the industry ever attacked. To my mind it appears that those who have taken part, with one or two exceptions probably, will have a great deal of pride in the picture that has been presented. The previous speakers have cited to you the necessity of apprentices, and I don't for one moment imagine that anybody here disagrees. During the last few years I have been confronted by people who asked questions. The semi-interested one asked why there was such a lack of mechanics in the industry. If I happened to know their politics, and if they were one of those good Democrats I then attribute the shortness of mechanics in the plasterers and bricklayers trades to the fact that the Demo-

*Secretary, Massachusetts State Council, United Brotherhood of Carpenters and Joiners of America, and member of the Apprenticeship Commission.

cratic party forgot there was such a man in existence at all during the time of the cantonment work. They turned it all over to the carpenters and plumbers and forgot all about the bricklayers, and that naturally discouraged many young men from entering the trade at that time. But things have changed. We now find many of our organizations, who are thoroughly in accord with an apprenticeship plan, confronted with lack of co-operation on the part of almost everybody connected with the industry. Everybody was ready to criticize, ready to pick faults with the system, and there was no opportunity for any labor organization or other interested body to grapple with this situation until the formation of the Boston Building Congress. And it is to that particular organization that the whole credit of this beautiful plan now in operation has to be attributed. Personally I am a product of a system of an apprenticeship that wasn't just a complete success, and at the termination of my apprenticeship I felt that if ever an opportunity should arise, I would do all in my power to better the condition of the boy, because some forms of apprenticeship did not prepare him for the industry as he ought to be prepared.

When this particular plan was brought back to the labor organizations (and I don't recall any piece of constructive work that was ever taken and scrutinized as carefully as this was) there was no particular viewpoint that was not delved into to see if the program was such that it would produce the type of mechanics that the previous speaker, Mr. Thornton, has described to you. After this scrutiny the Building Trades of Boston, which comprise all the mechanical elements, with one exception, of the industry, agreed to the plan and appointed three members to put it into operation from their side, and the result you have heard to-night.

Now this plan, laid down as it is, will not be a complete success unless we get the co-operation of everybody. That is essential. I can recall the Carpenters trying to put in an apprentice system as created by the carpenters themselves with no co-operation from anybody. We wove a plan into our Constitution that embodied everything this plan does, only not in so much detail; and what was the result? I ultimately got a

few boys into the industry and in following out the details found no co-operation from the employers. The reason for the complete failure of our effort was the fact that there was no disinterested faction to stand between what I represent and the employers, with the result, when we asked for a change of working conditions, war was declared and the apprentice is invariably lost. This plan will not permit of that. There will always be the Congress element to keep the contract, presuming that the two elements are not silly enough to have any further disturbances in the City of Boston. Anyhow the element from the Congress will hold the two factions together and so take care of the boys' future.

I recall one instance of putting the plan, we have since discarded, into effect. I prevailed upon one particular man to take an apprentice. He did, and started off wonderfully. When this boy got all the rough work needed, I found it necessary to intercede on the boy's behalf, and I was told, first in Hebrew and then in English, to go to a warmer climate. I finally was informed that my wishes would be complied with, and the boy was supposedly shifted to give him a chance to get acquainted with a better class of work. I followed the case up and found the boy cleaning a concrete mixer, which it is needless to say does not come under or near the trade training necessary to make a good carpenter.

Another thing this plan will eliminate is a case where the boy may immaturely feel he is a full-fledged mechanic and ought to shift for himself, as in the case where I apprenticed a boy who skipped into Portland, and the long-reaching arm of unionism went after him to Portland. We told his employer in Portland why we wanted the boy to come back and finish his apprenticeship, and insisted he should be discharged. Well, if you had ever listened to the array of the English language about my interference in his business, you would have given the apprenticeship system up for keeps. By co-operation of all, cases like this will be few. There are things attached to this apprenticeship system that will probably require a little study, and will require considerable explanation, on account of the fact that there are many things, that unless you are closely identified with

the industry you will not probably understand, for instance, the feature of the relation to the educational side of it. You may be surprised when you hear that labor was somewhat opposed to the educational features of the past systems. That opposition came from experience. They felt that with the modern educator and his system the educational side is likely to be made too intensive, in fact far removed from the actual needs of a man employed in the field or on the work. The intensive and high grade courses invariably made the boy lose interest, because the foundation for this particular type of education had not been laid prior to his coming into the industry. They invariably took the boy along the line of education he could not apply, as it was overlapping into the work of the engineer or the architect. In this plan we have mapped out a course we consider to be beneficial for the boy's immediate needs, and as he progresses in the system, the education will follow him according to his needs until the time he is able to leave the apprenticeship, then if he wants a great future like Mr. Thornton portrays to you, he can take advantage of the various systems this State provides.

Another feature of this plan is the fact that all branches of the industry will be interested in it, and by getting them interested in the plan we will not be confronted with the customary opposition we have met in the past, where owners and the public in general did not seem to want to assume the responsibility for having a boy on the job, on account of his little or no economic value to them. It has been brought to my attention again and again where owners have had occasion to talk to contractors because they had a boy on the job, not figuring that the Boy of To-day is the Man of To-morrow. By enlisting the support of all the elements we propose to get the amount of publicity from them that will show the good that is being accomplished, so that in the future it will be charged up to the project as one of the standing costs of the industry.

The previous speakers have not touched on the financial side. You must realize there will be considerable expense to put through this program, and I feel positive when I make this statement, that labor will contribute its share in the very near

future, and that the employers have already done so. So you must know there will be close co-operation between the two elements, and this is being brought about by this mutual participation I have described.

One more thing I want to call your attention to, so as to enlighten you in case your minds travel along the line, — why are there only two trades who have adopted this plan and are going ahead with it? In many of the other trades they are confronted with more problems than the bricklayer or the carpenter, on account of the "helper" or "improver" system. That system was acceptable both to the journeyman and to the employer and in many instances that is the problem they are trying to surmount to the satisfaction of everybody. This improver or helper was a man that never or very seldom came from the apprentice class. He continued in that class to his own disadvantage and to the disadvantage of the industry, because he was probably an asset to the industry in the particular notch he was in. The result is, in those industries they were not getting the proper type of men to supply the mechanical wastage of the industry. The helper system is wrong, and allows the wrong type into the trade, with the result that many trades are overstocked to-day with a type of men not a credit to the industry. By the next time you have an opportunity to hear this question discussed I believe all those trades will have followed in line similar to ourselves and that this plan will be in operation with them.

One more feature, — One reason why you might criticize the type of mechanic that is coming into the trade — that type Mr. Parker called "half-baked," — that particular type is on account of the fact that in the past America derived considerable of its mechanics from Europe. Those mechanics went through some form of apprenticeship and came over in droves in past years. They were very acceptable because of the amount of skill they had. But the situation has now changed so that the man of thirty years or so is not now the same stamp or quality of workman as the man who came over years ago. That man probably spent four years at the war and doubtless loafed four more before coming over. Consequently the man who

comes over now is not as good a workman as the man who came before that, and therefore it becomes compulsory to train our men.

That leads up to the question of asking for industrial co-operation with this commission, trusting that your Society will cheerfully do its proportionate part to bring about better mechanics, not only in Boston but in surrounding cities and towns, and help to set a mark for other cities to follow.

Joint Discussion

COL. GUNBY. I might add a little experience a contractor, old in experience, told me about. He was watching a young fellow a whole morning trying to set three stone steps. He had them on two rollers and was trying to get them set. He spent the whole morning and had them no nearer set at noon than when he began. Then the contractor began to get nervous and said to him, "Do you mind if I show you how to set those steps?" The young fellow straightened up very indignantly, — "I want you to understand I set all the stonework on (such and such) a building."

"It took you about two seconds to tell me that," said the contractor. "If I told you all the stone I have set it would take all the afternoon, and I'm going to show you how to set that stone and I don't want you to get mad either."

J. ARTHUR GARROD.* I should like to ask Mr. Thornton how the apprenticeship is coming out with the plasterers?

MR. THORNTON. Referring to Boston I can't say what their plan is. The plasterers here are distinct from the bricklayers and the masons. They are not in our organization.

MR. GARROD. Don't they belong to the International?

MR. THORNTON. Not to the International I represent. That is the title, — the Bricklayers, Masons and Plasterers' International Union and it applies to all New England with the exception of Boston, Cambridge, Lowell, Lawrence, Portland and Providence. In those cities the plasterers belong to the Operative Plasterers and Cement Finishers International Association.

* General Superintendent, Aberthaw Construction Company, Boston, Mass.

EDWARD S. LARNED.* I think it is particularly hopeful that two of those speaking for organized labor should express such improvement in their crafts. This leads me to ask what their attitude would be in regard to more liberal education of the apprentice. They have all spoken of the difficulty of securing continuous employment. That is not peculiar to the building trade. It applies for instance to the agriculturists. The young agriculturist hasn't a busy season in the winter time. A great many other industries could be cited of a similar nature. What is the attitude in regard to the apprentice acquiring a more general and broader knowledge of the building industry, not alone bricklaying or plastering, but anything else. Would he not be a better bricklayer and if he is allowed to acquire that information what would be the attitude of the industry in permitting him to make use of it?

MR. THORNTON. An apprentice has the privilege of taking up anything outside bricklaying he sees fit during his apprenticeship. Do you mean some other branch of the building industry?

MR. LARNED. Yes.

MR. THORNTON. I don't know just what the other crafts would do with an apprentice indentured to learn the bricklaying craft and who might also want to learn the plumbing craft. That is a matter for the Commission to decide.

MR. PARKER. May I speak a moment on that question, because it has been frequently put to me and I think the investigation that the Building Congress made in the matter of seasonal employment points fairly clearly to the answer to that question for this community. I think the speaker has had in mind the question of the mason-plasterer, who does both masonry and plastering. And it would sound plausible to-day that if when the mason was idle, as he sometimes is, he could turn his hand to the plastering trade he could thus eke out a longer term of employment in a given year. The situation as it appears, however, from our investigation of seasonal employment indicates — taking as an example just the mason and the plasterer — that

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the peak of employment in a large metropolitan center is practically identical for them both, so that when the masons begin to loaf through lack of work the plasterers are also loafing at approximately the same time; and as long as there is not enough work to keep all the plasterers busy it is hardly feasible for the bricklayers to take some of the plasterers' work. I think if you compare the curves on the charts which you probably have seen, you will find that the outdoor trades for the most part have their peaks overlapping in the summer months. Some indoor trades have their peaks in various parts of the winter but you will find it very difficult to put two logical trades together in the metropolitan district where a man can work at two trades with fairness to both.

I think that element in the matter of seasonal employment is the reason why a man, not of his own volition but by nature of the circumstances is forced to be a specialist. I think a good many people imagine the specialization of work in the building trades is a special invention not of the Devil but of the devilish Unions! This I believe is not so. It is the general conditions underlying the building operations of a large metropolitan community that forces mechanics to specialize. There is so much work in Boston for each craft in the industry, that it requires a considerable body of that craft to carry the peak load, and when they are partly idle there is nothing else for them to do. Also that very fact of specialization improves, generally, the character of the workmanship, and, generally speaking, in Boston you would not accept the kind of plastering that a country mason-plasterer would provide. In the small city or town there are still to-day the mason-plasterers, and the heating contractor may do in addition plumbing and gas piping, and the carpenter may do his roofing and three or four other trades. Outside of the large centers you will still find these combinations, but in the centers there is so much work of each kind at the peak of demand, that the mechanics must specialize.

RANSOM J. ROWE.* I am in sympathy with the apprentice movement, but I think that the system is seriously handicapped on its inauguration by lack of funds. I think, in entering into

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this movement, they should go at it in the right way. The proposition should be given publicity and the boys encouraged to join the ranks of skilled labor. A great many do not know the conditions that prevail to-day. They do not want to be plasterers or bricklayers. If that is so why don't they learn the paper hanging trade? The paper-hangers are earning \$166 a week. Do many of the boys know that? Wouldn't that job be attractive if broadcasted throughout the country?

Among the prime objects, I think one of the first things to be done is to set an example between the college job and the skilled labor job. Mr. Larned brought up the fact that education must be broad, and labor does appreciate education even if it does come secondhand.

Let me tell you about a young man I know of, a graduate of one of our colleges. His home was in Vermont and he came here looking for employment. He had letters to banks, heads of business houses, etc., but the best job that was offered him was at a salary of \$20 or \$21 a week with some prospect of advancement. One of the industrial plants would take him on as a cost accountant at \$21 per week with a promise of advancement if he hung on and gave satisfaction. This young man had worked his way through college and at the same time helped to support his family. He was about discouraged with job hunting, when while walking down the street one day he saw a wooden structure going up with the lathers at work in it. He remembered that he knew something about lathing, for while earning his way through college he had worked at this trade. It was a simple story. The workmen told him there was plenty of employment and that they were getting \$1.25 per hour, or a dollar a bunch, some putting on fifteen or sixteen bunches a day. He asked if they thought he could get a job and they told him they thought he could as there was plenty to do, and that the boss would be around pretty soon. He waited until the contractor arrived and was told that there was work for him. So he then wanted to know if he could get into the union. They told him that the union was not a tight organization, but first it would be necessary for him to show them whether he could lathe. So he got the job and finally was called into the labor

organization, but not being acquainted with the labor movement, he was somewhat reluctant to attend the meeting. He was afraid of something he had not seen in Vermont, but of course he had to go. Before he went the president of the organization, who had been tipped off that here was a young man out of the ordinary, told him to come back to the next meeting and meanwhile to go ahead with his work. When they found out that he was a college man, had an academic training, but had been glad to get the work because he needed the money, they asked if he would do a little work for the organization, making out description cards, as the organization was then installing an aid and comfort system for the sick members. They told the young man to take the cards home and fill them out and get union pay. Very soon they got him on his feet and found he talked very well. Soon it became known at headquarters that they had a young man who was a lather but was also educated and could talk, so they sent for him from headquarters and questioned him as to whether he was satisfied with being a lather and also if his folks knew he had a position. He told them that he had written his people that he had a position in Boston but had not told them that he was a lather. The union was very much satisfied with his work and asked him to do more for them and get into the movement. He was in doubt as to whether he was in sympathy with the movement. They were very much surprised at this and could not understand why he would not be in sympathy with it if it was good enough work to bring him in fifteen or sixteen dollars a day. They then told him that he must be in sympathy with it, because they wanted his college education and his college culture as well as his knowledge of the lather's trade, to work with them in building up their organization. They said that in every large group there is a little taint of bolshevism, and they wanted him to talk that down. They wanted that organization to be one hundred per cent American.

That is where the labor organization appreciated education and I hope they will have that education which will make them a credit to themselves, their trade, their families and their country.

MR. GAULD. I would like to say to the gentlemen that we

have made it quite attractive, within reasonable grounds. The wages agreed were really unheard of in days gone by. The apprentice starts at forty per cent, which is quite an inducement for any boy to come into the industry and go through what we expect him to go through. He will get an increase in wages at the end of each term, and will be in a position to command full journeyman's wage at the end of the course. We are making it very attractive for them to come in and I think we are getting better boys in the carpentry industry than they are in the bricklayers, with their lower percentage.

MR. LARNED. What do you think of vocational training in the schools?

MR. GAULD. I am enthusiastic over the idea, but discouraged with the results. My experience has been that the boy that got this technical training in the school seldom goes into the industry or into the unit that he expected to at the time he took his training. The training is very good. It is kindred to what he would get if he went into the trade, but statistics not only in Boston but throughout the country show that he is discouraged when he attempts to put his training into practice. The training makes him think he would make a better draftsman than carpenter but he probably proves a better carpenter than a draftsman. That type has been illustrated in some of the intensive systems. He goes to school for a little while and the teacher tells him he is an exceptionally good scholar and after that he wants a white-collar job.

JOHN E. DALGLISH.* I am interested in this apprenticeship system for this reason. It is a mighty good thing and is a great improvement over the system I served on. I am glad the laboring men approve of this new system and are trying to make it work successfully. I represent one of the hardest trades in the building industry. As an editorial in a New York paper said the plasterer's trade was for the young man, the man between twenty and forty-five years of age. And this is true because he cannot work at this trade much longer. There are three things in life that do not wait for man, — time, trade and plaster.

* Plasterer, 17 Cleveland Street, Somerville, Mass.

Under the system I served on a boy had to serve from five to seven years. I think if we could get the boys in the moulding age from fourteen to nineteen years of age we could do more with them. Of course I mean to work in harmony with the state educational authorities.

I think the plasterer's son should have a preference — "Like father like son."

There are about twenty boys serving in Boston at present as apprentices in the plastering trade.

COL. GUNBY. One of the conditions that we hope the new apprenticeship system will obviate, is that the individual employer will not be solely responsible for the whole training of the apprentice. If he can supply certain elements of it the union can arrange to help with the rest.

The idea is, if the boy is apprenticed to the craft rather than to the individual, there is a much better chance of keeping him employed as men who can't give him the full range of training can give him one kind, or if the employer has not enough work to warrant his keeping him throughout the entire time of the apprenticeship he can at least contribute his share.

You can't put the small town or odd job plasterer on a city job requiring fine finish. People wouldn't stand for it. So it is necessary to treat metropolitan apprentices on a different basis from that which would meet the needs of a small community, because city people demand a higher grade of workmanship. I have a great admiration for the country mechanic, but he has his limitations.

MR. PARKER. I think one advantage of the system, of the boy being indentured to the craft committee, is suggested by Mr. Dalglish. Not only will it help to keep him continuously employed but it will help the employer. Some employers can give this apprenticeship training only at times, and this plan enables one like the last speaker to do his share when he is able, to give the impulse and the training that a skilled mechanic should have, without making him carry the entire burden of such an apprenticeship throughout the whole period.

JOHN N. McLAREN. I represent the stonemasons and I have one suggestion that may be helpful. I am personally very

much interested, because the future of the mason depends on it. A good many of the trades are not fully informed about the apprenticeship plan, notwithstanding the efforts of Mr. Walsh, Mr. Johnson and others. I think if there could be a direct appeal and if a meeting could be held with representatives from each trade and they could listen to a general talk on the subject to get a more intimate knowledge of it, you would get more co-operation and possibly more funds. There is nothing like being intimately associated with an association to get anything from it. I believe you will get the co-operation you want within the next two or three years. The officers are good executives but you want also to get the rank and file of the organizations interested through their representatives.

MR. PARKER. I would like to say that the Commission has that point definitely in mind. When we have completed some of our products, we hope to develop a definite practice of awarding diplomas to the graduate apprentices in a dignified manner, and to make that an occasion for getting together with the other apprentices who are coming along in their various terms, and thus develop an esprit de corps.

COL. GUNBY. Such a meeting was planned at one time, with the hope of getting the heads of all the crafts together, but unfortunately it came just when they were more interested in getting trade agreements signed up.

At one time I went to one of their Council meetings with Mr. Parker and a contractor trying to sell this idea to the labor union. The contractor made the very definite statement that he thought the contractors were more responsible for the lack of apprentices in Boston than the unions.

**GENERAL REGULATIONS FOR APPRENTICES
IN THE
CARPENTRY CRAFT***

**OF
BOSTON AND VICINITY**

**ADOPTED BY THE
JOINT APPRENTICESHIP COMMITTEE
OF THE
CARPENTRY CRAFT***

**AND
APPROVED BY THE APPRENTICESHIP COMMISSION
AUGUST 8TH, 1923**

1. Enrollment of Apprentices

Before apprentices are assigned to work as regularly employed apprentices, they shall be enrolled with the Joint Apprenticeship Committee.

2. Identification of Apprentices

The Book given to the apprentice upon his enrollment shall be his identification when officially endorsed and sealed.

3. Probationary Period

All apprentices shall be subject to a probationary period which shall cover the first six (6) months of employment.

4. Age for Apprentices †

The minimum age of apprentices for starting in this craft shall be sixteen (16) years and the maximum age shall be twenty-two (22) years.

The minimum age of apprentices for starting in the craft shall be seventeen (17) years and the maximum age shall be twenty-one (21) years.

5. Terms of Apprenticeship †

A full term of apprenticeship shall be four years unless the applicant is given advanced credit for previous trade experience or work at an approved school in the discretion of the Joint Apprenticeship Committee, or unless he fails to meet the required standards which may result in the lengthening of the term.

* Similar regulations have been adopted by the Joint Apprenticeship Committee of the Bricklaying Craft and approved by the Apprenticeship Commission. Both sets of regulations are identical except for Articles 4, 5, 6, 10 and 20. For each of these articles the corresponding regulations of the Bricklaying Craft are printed in *italics*.

† Articles adopted by the Carpentry Craft shown in Roman type, those of the Bricklaying Craft shown in *italics*.

A full term of apprenticeship shall be three years unless the applicant is given advanced credit for previous trade experience or work at an approved school in the discretion of the Joint Apprenticeship Committee, or unless he fails to meet the required standards which may result in the lengthening of the term, or unless boy starts under eighteen (18) years of age.

6. Division of Apprenticeship Into Periods of Advancement †

The full term of apprenticeship shall be divided into eight periods of six months each, and the apprentice shall receive his advanced rating and classification upon satisfactory completion of each period.

The full term of apprenticeship shall be divided into six periods of six months each, and the apprentice shall receive his advanced rating and classification upon satisfactory completion of each period.

7. Periodic Examination of Apprentices

An examination shall be required of each apprentice by the Joint Apprenticeship Committee at the close of each six months' period to qualify for advancement — such examination to cover oral and written work and a demonstration of his practical ability with a report of his accomplishment during the period being terminated.

8. Advanced Credit to Apprentices for Previous Experience

Advanced credit will be allowed an apprentice for previous trade experience or work in an approved school, and he shall be entitled to such advanced rating as may be determined by the Joint Apprenticeship Committee upon a review of the qualifications and experience presented for such consideration.

9. Transfer System for Interchange of Employment

All interchange of employment by apprentices shall be adjusted through the Joint Apprenticeship Committee.

10. Apprenticeship Wage by Periods †

(a) At Work.

The minimum wage for apprentices is established as follows:

1st period of six months	40% of journeyman's wages
2nd period of six months	50% of journeyman's wages
3rd period of six months	55% of journeyman's wages
4th period of six months	60% of journeyman's wages
5th period of six months	65% of journeyman's wages
6th period of six months	70% of journeyman's wages
7th period of six months	75% of journeyman's wages
8th period of six months	80% of journeyman's wages

† Articles adopted by the Carpentry Craft shown in Roman type, those of the Brick-laying Craft shown in *italics*.

The minimum wage for apprentices is established as follows:

- 1st period of six months 32% of journeyman's wage*
- 2nd period of six months 36% of journeyman's wage*
- 3rd period of six months 42% of journeyman's wage*
- 4th period of six months 48% of journeyman's wage*
- 5th period of six months 52% of journeyman's wage*
- 6th period of six months 62% of journeyman's wage*

(b) At School.

There shall be no wage paid the apprentice for time spent in the regularly established evening school sessions.

During the term of apprenticeship the employer shall allow the apprentice the full regular hourly wage rate for time spent in school during working hours as approved by the Joint Apprenticeship Committee. There shall be no wage paid the apprentice for time spent in the regularly established evening school sessions.

11. Overtime Limits

An apprentice shall be allowed to work overtime as mutually agreeable to him and his employer subject to the rules to be established by the Joint Apprenticeship Committee but not in conflict with his required attendance at evening school.

12. Hours Per Week

(a) At Work.

The regular hours of work each day for apprentices shall be the same as established for the journeyman of the craft.

(b) At School.

Not less than four hours a week attendance at a school approved by the Joint Apprenticeship Committee.

13. Determination of Time for School Attendance

Attendance at school shall be during the regularly established evening school session.

14. Enforcement of School Attendance

Apprentices who do not fulfill their obligations so far as school attendance is concerned may have their enrollment books withdrawn by the Joint Apprenticeship Committee, and thereupon shall lose standing as an apprentice and all rights of employment as such.

15. Classification of Apprenticeship

Apprentices in this craft shall be regularly employed in any of its classified branches either in the shop or on outside jobs.

16. Trade Processes to Be Taught the Apprentice

The trade processes which comprise this craft and in which apprentices are to receive thorough instruction either in school or on the job shall be as prescribed by the Joint Apprenticeship Committee.

17. Course of Study in School

The course of study to be taught apprentices in school instruction shall include related mathematics, trade sketching and drawing, shop practice, related science and general information.

18. Supervision of Apprentices

With the cooperation of the instructor, a complete record of the apprentice's performance shall be kept by the Joint Apprenticeship Committee, being subject to examination at all reasonable times.

19. Regulation of Adjustments

In case of dissatisfaction on the part of the employer or the apprentice either one has the right and privilege to appeal at any time to the Joint Apprenticeship Committee for the necessary action and adjustment.

20. Ratio of Apprentices to Journeymen †

The ratio of apprentices shall be as prescribed by the Joint Apprenticeship Committee.

Not more than three to each recognized builder.

21. Selection of Employers to Whom Apprentices May Be Assigned

Employers to whom apprentices are assigned shall be such as can furnish the apprentice the required experience in the trade. An apprentice shall be transferred to other employers from time to time if necessary in order to permit him to obtain all-round experience, or to provide continuity of employment.

22. Special Regulations

All special regulations are to be determined from time to time by the Joint Apprenticeship Committee and all amendments to this plan for apprenticeship shall be made by said Joint Apprenticeship Committee as occasion demands.

23. Agreement of Apprentice to Abide by Rules

Every apprentice regularly enrolled shall be required to indicate on his enrollment book that he has read the foregoing regulations and agrees to abide by them.

24. Granting of Diploma Upon Termination of Apprenticeship

Upon the successful completion of his apprenticeship each apprentice shall be provided with a diploma containing a statement concerning his trade experience, educational training, journeymanship standing and wage rating, regularly certified by the Joint Apprenticeship Committee and countersigned by the Commission on Apprenticeship, which shall entitle him to employment on a full journeyman's basis.

† Articles adopted by the Carpentry Craft shown in Roman type, those of the Bricklaying Craft shown in *italics*.

25. The Definite Provision of Classes in School for the Instruction of Apprentices

The size of the unit and other details shall be determined by the Joint Apprenticeship Committee according to its requirements.

26. Continuous Employment of Apprentices

It shall be the duty and responsibility of the Joint Apprenticeship Committee to provide continuous employment to regularly enrolled apprentices who have satisfactorily completed their probationary period, subject to the regulations contained herein.

27. Umpire

The Commission on Apprenticeship shall render decision in matters pertaining to apprenticeship regarding which there may be an equal division of opinion in the Joint Apprenticeship Committee.

APPRENTICESHIP COMMISSION

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H. S. FRENCH
W. H. OAKES
J. N. WILLCUTT

Representing Labor

J. M. GAULD
E. A. JOHNSON
J. T. WALSH

Representing Building Congress

W. H. GRAVES
F. M. GUNBY
W. S. PARKER

JOINT APPRENTICESHIP COMMITTEE FOR THE CARPENTRY CRAFT

Representing Employers

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W. H. ROOT
A. B. DRISKO

Representing Labor

COLIN CAMERON
JOSEPH F. TOOMEY
JAMES M. GAULD

JOINT APPRENTICESHIP COMMITTEE FOR THE BRICKLAYING CRAFT

Representing Employers

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C. P. WOODBURY

Representing Labor

GEO. K. WATSON
EDMUND RUSSELL
JOHN A. RYAN

ACTIVITIES OF THE FEDERATED AMERICAN ENGINEERING SOCIETIES

ENGINEERS TO PUSH PLAN FOR FEDERAL DEPARTMENT OF PUBLIC WORKS

The engineers of the United States have long advocated a Federal Department of Public Works. In the past there has been, at different times, a concerted effort in behalf of the establishment of such a department. Early in 1919 Engineering Council invited 185 engineering and allied technical organizations to send one delegate each to a conference in Chicago for the purpose of taking such action as appeared necessary to achieve the desired result. Seventy-one delegates representing seventy-four technical organizations attended this conference. The National Department of Public Works Association was later organized for the purpose of promoting the formation of a Federal Department of Public Works.

The Association appointed a committee to draft a bill for the establishment of such a department. This bill, generally known as the Jones-Reavis Bill, was introduced into both houses of Congress June 25, 1919. As the campaign continued it became the belief of certain influential senators that the best way to secure the desired result would be to introduce a bill to provide for a general reorganization of the Federal Government. Consequently Senator Smoot introduced a Joint Resolution, which was passed, providing for a Joint Committee of the Senate and House on Government Reorganization.

In the last presidential campaign the Republican platform contained a plank committing the party to reorganization. Soon after President Harding was elected he appointed Walter F. Brown as his personal representative upon the Joint Committee. Mr. Brown was made chairman of the committee and immediately proceeded to develop a plan of reorganization. After many months of work and delay a plan was approved by Presi-

dent Harding and his Cabinet, which plan was submitted to Congress February 13, 1923.

In the meantime the engineers and their associates awaited developments, assistance being rendered, however, to Mr. Brown and his committee. As soon as the reorganization plan was made public the engineers gave it careful study, particularly those provisions that related to public works. This plan provided for two divisions of the Department of the Interior, namely, a Division of Public Domain and a Division of Public Works. The Division of Public Works contained in most essentials those functions that the engineers believed should be placed under centralized engineering direction. The variations from the provisions of the Jones-Reavis Bill were inconsequential, so that the plan has been generally approved by the engineers.

Since the announcement of the reorganization plan no progress by the Government has been noticeable, while on the other hand it is known that opposition to parts of the general plan has been growing. It is believed in high government circles that the entire plan has little chance of ever securing the approval of Congress, and it appears that the only way to bring about a reorganization of the Federal Government is by securing piece-meal legislation with the general objective always in mind.

As the proposed reorganization of the Department of the Interior is further advanced and more generally accepted as feasible, it is thought that it should be pressed at this time. Therefore the Executive Board of American Engineering Council at its meeting in Rochester, October 12 and 13, 1923, passed the following resolution:

WHEREAS, The engineers of the United States, through Engineering Council, with the assistance of the architects and contractors organized in the National Public Works Department Association, for several years led a campaign to change the Department of the Interior into a Department of Public Works, to which should be transferred all the non-military engineering and construction functions of the Government; and to that end prepared and had introduced into both houses of Congress a bill widely known as the Jones-Reavis Bill, and

WHEREAS, In 1920 by advice of influential Congressmen and Senators further effort towards such department was suspended by the engineers upon representation that such Department of Public Works should be included in a plan for general reorganization of the Government departments, and

WHEREAS, A reorganization committee established by Congress, after many months, presented a general reorganization scheme, which included a Division of Public Works as one of the two divisions of a reorganized Department of the Interior which includes the essential features proposed by the engineers in their original plan, and

WHEREAS, Such plan of general reorganization was recommended and met the approval of the late President Harding and his Cabinet, but promises from its very comprehensiveness to meet opposition, delay and possible defeat, in Congress, and

WHEREAS, There seems no such serious opposition to the reorganization of the Department of the Interior alone,

NOW, THEREFORE, BE IT RESOLVED, That the President of American Engineering Council be authorized to appoint a special committee to draft and have introduced into the Congress a bill carrying into effect that portion of the reorganization plan prepared by the Joint Committee of the House and Senate under the chairmanship of Mr. Walter F. Brown, which deals with the Department of the Interior. And

FURTHER BE IT RESOLVED: That American Engineering Council, recognizing the equal interest and activity in past efforts for the establishment of a Department of Public Works shown by other engineering, architects and contractors organizations, instructs the Executive Secretary to communicate these resolutions to all other such organizations, and to request their renewed active financial and political assistance in support of the proposed measure.

The Executive Board further voted that a general conference on a Federal Department of Public Works be called in conjunction with the Annual Meeting of American Engineering Council at Washington in January, 1924, and that an invitation be extended to engineering and allied technical organizations to send one or more delegates to the conference.

Thus the engineers are again taking up an active campaign for a Federal Department of Public Works. It is the earnest desire of American Engineering Council that it may have the active support of all engineering and allied technical organizations in its efforts to secure the approval by Congress of that part of the reorganization plan relating to transfer into and out of the Department of the Interior, through which is to be realized a Division of Public Works. This means that if the plan as at present recommended becomes effective the Bureau of Mines and the Patent Office will be transferred to the Department of Commerce, while the non-military engineering activities of the War Department will be transferred to the Depart-

ment of the Interior, together with the Supervising Architect's Office from the Treasury Department, the Bureau of Public Roads from the Department of Agriculture, and the Federal Power Commission, which is now an independent establishment, would also be placed under the direction of the Department of the Interior.

When these plans are completed the Department of the Interior would be changed from its present organization to the following organization:

Assistant Secretary for Public Domain:

- Administration of Alaska and Hawaii
- Indian Lands and Reservations
- General Land Office
- Geological Survey
- War Minerals Relief Commission
- National Park Service
- National Military Park Commissions (War)
- Federal Power Section (Federal Power Commission)

Assistant Secretary for Public Works:

- Bureau of Public Roads (Agriculture)
- Supervising Architect's Office (Treasury)
- Alaskan Engineering Commission
- Reclamation Service
- Board of Engineers for Rivers and Harbors (War)
 - Board of Engineers, New York City (War)
 - United States Engineer Offices (War)
 - Mississippi River Commission (War)
 - California Debris Commission (War)
- Board of Road Commissioners for Alaska (War)
- Bureau of District of Columbia Buildings and Grounds
 - Office of Public Buildings and Grounds (War)
 - Commission of Fine Arts (Independent)
 - Superintendent of State, War, and Navy Department Bldg. (Independent)
 - Architect of the Capitol (Congress)
 - Rock Creek and Potomac Parkway Commission (Independent)
- Solicitor (Justice)

The present Department of the Interior is organized as follows:

First Assistant Secretary:

- General Land Office
- Reclamation Service
- National Park Service

Assistant Secretary:

Bureau of Indian Affairs (Schools to Education and Welfare)

Bureau of Pensions (Education and Welfare)

Patent Office (Commerce)

Bureau of Education (Education and Welfare)

St. Elizabeth's Hospital (Education and Welfare)

Howard University (Education and Welfare)

Freedman's Hospital (Education and Welfare)

Administration of Alaska and Hawaii

Geological Survey

Bureau of Mines (Commerce)

Government Fuel Yards (Bureau of Purchase and Supply, Independent)

Alaskan Engineering Commission

War Minerals Relief Commission

BOSTON SOCIETY OF CIVIL ENGINEERSFOUNDED 1848

PROCEEDINGS

MINUTES OF MEETINGS**BOSTON SOCIETY OF CIVIL ENGINEERS**

BOSTON, October 17, 1923. — A regular meeting of the Boston Society of Civil Engineers was held this evening in Chipman Hall, Tremont Temple, and was called to order at 8.00 P.M., by the President, Frank M. Gunby. There were about 140 members and guests present.

The minutes of the previous meeting were approved as printed in the October JOURNAL.

The President reported the election of John Lucas to the grade of Member * by the Board of Government at a meeting held today.

The Secretary announced the death of two members of the Society, William Dexter Bullock, who died on April 30, 1923, and Theodore Parker, who died on June 14, 1923. The President stated that committees would be appointed to prepare memoirs.

The President announced that an Affiliation meeting was to be held in November on the subject of "Immigration as it Affects the Labor Situation," and that it was expected that Hon. James J. Davis, U. S. Secretary of Labor, or an official representative of that department, would speak. In view of the general interest in this subject and in order that the Boston Society of Civil Engineers could co-operate with the Affiliation to the fullest extent, the Board of Government recommended that the Society omit its regular November meeting.

* Transferred from grade of Junior.

On motion of Mr. F. O. Whitney, it was voted that the regular meeting of the Society on Wednesday, November 21, be omitted.

In accordance with a recommendation of the Board, presented by the President, and upon a motion by Prof. C. M. Allen, it was voted that the Board of Government be authorized to use the income from the permanent fund for the current year to such an extent as they deemed necessary in payment of the current expenses of the Society. In accordance with the By-Laws an affirmative vote by the Society at two successive meetings is necessary to authorize such action.

The President then introduced Charles T. Main, who told of his early experiences as an engineer and outlined the changes which had taken place in engineering matters since that time. In closing he urged that engineers broaden their vision to include the human and business side of engineering and that they endeavor to be more tolerant of the other man whose viewpoint may not be the same as their own.

The next speaker, Mr. William H. Sayward, for many years Secretary and one of the leading spirits of the Master Builders' Association, related many amusing incidents of his daily work and told of the large amount of satisfaction which he had experienced as Secretary of this Association. He said that he had recently written an article on education which was too long for presentation at this meeting, but which would be sent to the members of the Society.

J. Parker Snow, Consulting Engineer, outlined a vision of improved terminal facilities in Boston which he believed could be had without an undue expenditure of money. The suggested developments included the unification of freight and water front terminals, operated by a single authority, and the linking up of transportation lines by a belt line railroad, which would comprise portions of existing railroads with a small amount of new branches and connections.

The difficulty of handling construction work, particularly the pouring of concrete, when a large amount of water was present, was discussed by William F. Williams, Commissioner of Public Works of Massachusetts, who described many troublesome con-

ditions he had encountered and told in an interesting manner of the methods used in solving the problems.

The last speaker, James W. Rollins, gave a lantern slide talk of the construction of the caissons and piers for the Piscataqua River Bridge at Portsmouth, N. H., which was completed about a year ago. Mr. Rollins also told many amusing anecdotes of his early experiences in railroad location surveys in the unsettled portions of the West.

The meeting adjourned at 10.00 P.M., after giving a rising vote of thanks to those, not members of the Society, who had taken part in the program.

J. B. BABCOCK, *Secretary*.

SANITARY SECTION

BOSTON, October 3, 1923. — A regular meeting of the Sanitary Section of the Boston Society of Civil Engineers was held in the Society Rooms, Tremont Temple, this evening, and was called to order by the Chairman, John P. Wentworth, at 7.50 P.M.

Arthur L. Gammage was elected Clerk *pro tem*.

As there was no preliminary or new business Mr. Edgar S. Dorr, Engineer-in-charge of Special Work, Sewer Division, Department of Public Works, Boston, Mass., was introduced as the speaker of the evening. Mr. Dorr spoke on "Some Details of Boston Sewer Work." The talk included a very thorough account of the growth of sewer construction for the City of Boston, and was excellently illustrated by 145 lantern slides.

The paper was discussed by Messrs. Eddy, Porter, Horne, Lovejoy, and others.

There were 44 members and guests present.

The meeting adjourned at 10.40 P.M.

ARTHUR L. GAMMAGE, *Clerk, pro tem*.

DESIGNERS SECTION

BOSTON, October 10, 1923. — The regular meeting of the Designers Section of the Boston Society of Civil Engineers was called to order at 6.15 P.M. by the Chairman, Walter W. Clifford.

The reading of the report of the previous meeting was dispensed with.

The film furnished by the Saco-Lowell Shops could not be shown on account of some trouble with the lantern.

The Chairman introduced Mr. Kenneth Moller, of Lockwood, Greene & Co., who, after saying that he had prepared no paper of any sort and had depended upon the pictures for his talk, proceeded to give a most interesting and instructive talk upon "The Design of Textile Mills."

Mr. Moller talked of the general features of the cotton industry, gave reasons for the industry moving south, and described in detail the entire process of the manufacture of cotton cloth.

An interesting discussion followed the talk.

There were 74 members and visitors present.

The meeting adjourned at 7.50 P.M.

WALDO F. PIKE, *Clerk.*

NORTHEASTERN UNIVERSITY SECTION

BOSTON, October 8, 1923. — The first meeting of the college year of the Northeastern University Section of the Boston Society of Civil Engineers was held today at the University.

The meeting was called to order by Chairman Harold W. Kelly, at 12.10 P.M.

The Chairman introduced the President of the Boston Society of Civil Engineers, Col. Frank M. Gunby. Colonel Gunby, after giving a brief history of the organization and relating the benefits derived from an engineering society, gave an interesting talk on the general motions in the construction of a modern building.

Professor Alvord and Chairman Kelly offered a few remarks in conjunction with Colonel Gunby's talk.

Mr. Thomas, of the Harvard Engineering Society, was present and extended an invitation to all to attend their meetings.

The Junior and Sophomore civil engineering students were the invited guests of the Section.

Members present 10, visitors 51.

Meeting adjourned at 1 P.M.

FRED W. CHASE, JR., *Clerk.*

APPLICATIONS FOR MEMBERSHIP

[November 15, 1923]

THE By-Laws provide that the Board of Government shall consider applications for membership with reference to the eligibility of each candidate for admission and shall determine the proper grade of membership to which he is entitled.

The Board must depend largely upon the members of the Society for the information which will enable it to arrive at a just conclusion. Every member is therefore urged to communicate promptly any facts in relation to the personal character or professional reputation and experience of the candidates which will assist the Board in its consideration. Communications relating to applicants are considered by the Board as strictly confidential.

The fact that applicants give the names of certain members as reference does not necessarily mean that such members endorse the candidate.

The Board of Government will not consider applications until the expiration of twenty (20) days from the date given.

For Admission

BIRRELL, DONALD VAN COURT, Brookline, Mass. (Age 23, b. East Orange, N. J.) Entered Rutgers College in 1918 for course in civil engineering. Employed in summer vacations under Civil Service of State of New Jersey in the Highway Dept.; graduated from Rutgers College, 1922. With Stone & Webster, Inc., July, 1922, to date. Refers to H. P. Fessenden, H. A. Hageman, C. E. Nichols, E. H. Rockwell and D. M. Wood.

BOGREN, GEORGE GUSTAVE, Cohituate, Mass. (Age 23, b. Cohituate, Mass.) Graduated from Harvard Engineering School, 1922, with degree of B.S. in Sanitary Chemistry. From July, 1922, to July, 1923, was employed in the Engrg. Division of Mass. State Dept. of Public Health; August, 1923, to date, with Weston & Sampson as Assistant Sanitary Engineer. Refers to A. L. Gammage, H. E. Holmes, A. D. Weston, R. S. Weston and E. Wright.

CHASE, HUGH DONALD, Newton, Mass. (Age 25, b. Unity, Maine.) Graduate of Mass. Inst. Tech., 1923, with degree of B.S. in civil engineering. Entered employ of New England Telephone & Telegraph Co.; at present in the student employees' training course which will be completed in November.

Refers to J. B. Babcock, C. B. Breed, J. W. Howard, G. E. Russell and C. M. Spofford.

DRESEL, RALPH RUTHERFORD, Brookline, Mass. (Age 24, b. Cedarhurst, Long Island.) Is a student at Mass. Inst. Tech., fifth year. Is also assistant in Dept. of Civil Engineering at Technology. Refers to J. B. Babcock, C. B. Breed, J. W. Howard, K. C. Reynolds, C. M. Spofford and H. Sutherland.

LESSARD, THEODORE THOMAS, Springfield, Mass. (Age 20, b. Springfield, Mass.) Graduate from Springfield Technical High School in 1921; at present a junior at Northeastern University. Refers to H. B. Alvord, C. S. Ell, J. W. Ingalls and W. E. Nightingale.

MCCARTHY, EDWARD ROBERT, Natick, Mass. (Age 20, b. Natick, Mass.) Worked as a grade "A" engineer for the Mass. Dept. of Public Works, Division of Highways, during the summers of 1921 and 1923. Is at present a junior in Tufts Engineering School. Refers to R. Abbott, R. W. Coburn, A. W. Dean and H. F. MacWilliams.

PERRY, HORACE BURR, South Weymouth, Mass. (Age 30, b. New Haven, Conn.) Graduate of Yale University in 1916, in civil engineering; post graduate work, 1917. Worked summers while at college; 1918-April, 1920, with Bureau of Yards and Docks, New London, Conn.; April, 1920, to date, with Jackson & Moreland, on appraisal work, reinforced concrete design and field work. Refers to E. H. Cameron, W. W. Clifford, W. D. Henderson, D. C. Jackson and E. L. Moreland.

SHUMAVONIAN, SORUN P., Boston, Mass. (Age 22, b. Manchester, N. H.) Graduate of Mechanic Arts High School in 1919; at present a senior at Northeastern University, school of engineering. Refers to H. B. Alvord, A. O. Bradshaw, C. S. Ell and W. E. Nightingale.

THOMPSON, HARRY LAWRENCE, Boston, Mass. (Age 24, b. Jolley, Ia.) Graduate of Mass. Inst. Tech. in civil engineering, 1923. Is now engineering assistant Mass. Department of Public Health, Engrg. Div. Refers to J. B. Babcock, K. C. Reynolds, C. M. Spofford, H. Sutherland and E. Wright.

TYLER, RICHARD GAINES, Cambridge, Mass. (Age 38, b. Georgetown, Texas.) Took C.E. degree at University of Texas in 1908, B.S. in civil engineering at M. I. T. in 1910. Spent 1 year in irrigation work with concrete construction in Colorado; 1½ years first assistant engineer with Texas Reclamation Board; 1 year as assistant city engineer, Austin, Texas; 3 years as city engineer, Paris, Texas; 6 years as instructor, associate professor, University of Texas; 2 years Dean of Engrg., Oklahoma A. & M. College; at present Associate Professor of Sanitary Engineering at Mass. Inst. Tech. Refers to W. R. Holway, D. Porter, K. C. Reynolds, G. E. Russell, C. M. Spofford and H. Sutherland.

LIST OF MEMBERS

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LIBRARY NOTES

BOOK REVIEW

"ELECTRICAL VIBRATION INSTRUMENTS," by A. E. Kennelly, Sc.D., Professor of Electrical Engineering, Harvard University and Massachusetts Institute of Technology. The Macmillan Company, New York, 1923. 450 pp.

REVIEWED BY HOWARD S. KNOWLTON

In this valuable addition to the Engineering Science Series, edited by Dugald C. Jackson, C.E., and Earl R. Hedrick, Ph.D., the author has set forth the fundamental principles and characteristics of telephone receivers, oscillographs and vibration galvanometers, with a comprehensive treatment of the mechanics of vibration as related to these instruments. The study of these instruments as reciprocating electric motors is pursued with the customary skill of the author in turning mathematics to engineering account. Readers of this book will find it helpful in attaining a deeper understanding of alternating current phenomena, and the work offers an exceedingly attractive presentation of underlying electro-mechanical theory to the discerning passer-by. Much of the subject-matter is based upon researches conducted in the electrical engineering laboratories at the Massachusetts Institute of Technology and at Harvard University during the past fourteen years. Valuable co-operation and suggestions from the Bell telephone organization have enriched these investigations. Fourteen appendices occupying 126 pages are included for the benefit of those desiring to follow the mathematical aspects of the subject more intensively, and there are an excellent bibliography and index.

RECENT ADDITIONS TO THE LIBRARY

U. S. Government Reports

Statistics of Railways in U. S. 1921.

Water Supply Paper Nos. 494, 527.

State Reports

New York. Annual Report of State Department of Health, 1921, Vol. 1.

Municipal Reports

Philadelphia, Pa. Annual Report of Bureau of Surveys. 1922.

Miscellaneous

Car Builders' Cyclopedia.

Directory of Directors in City of Boston. Gift of Frank A. Barrett.

Directory of Directors in State of Rhode Island. Gift of Frank A. Barrett.

Directory of Massachusetts Manufacturers. 1922.

General Electric Catalogue.

Industrial Plants. Vol. 3. Gift of Chas. T. Main.

Locomotive Cyclopedia.

Maintenance of Way Cyclopedia.

Material Handling Cyclopedia.

Movable and Long Span Steel Bridges. Hool & Kinne. Gift of McGraw-Hill Co., Inc.

Proceedings of American Concrete Institute, 1916, 1918, 1920-23 incl. Gift of L. C. Wason.

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